Linear Functions

A. Determine the indicated characteristics:

1. The slope and y-intercept of the equation:
    $y = (2/3)x - 6$

$$m = \frac{2}{3}, b = -6$$

2. The slope and y-intercept of the equation $5x - 2y = 7$

$$-2y = -5x + 7$$
$$y = \frac{-5}{-2}x + \frac{7}{-2}$$
$$m = \frac{5}{2}, b = -\frac{7}{2}$$

2. The slope of the line segment joining the points (-5, 1) and (-12, 9).

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-9}{-5-(-12)} = \frac{-8}{-5+12} = \frac{-8}{7}$$

3. The midpoint of the line segment defined by the points (-5, -9) and (11, -3)

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{(-5)+11}{2}, \frac{(-9)+(-3)}{2}\right) = \left(\frac{-5+11}{2}, \frac{-9-3}{2}\right) = \left(\frac{6}{2}, \frac{-12}{2}\right) = (3,-6)$$

4. The length of the line segment defined by the points (8, -2) and (-3, 5).

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(8-(-3))^2 + ((-2)-5)^2} = \sqrt{(8+3)^2 + (-2-5)^2} =$$
$$\sqrt{(11)^2 + (-7)^2} = \sqrt{121+49} = \sqrt{170}$$

B. Determine the equation of the following linear functions given the indicated information:

1. slope is 2/3 and the y-intercept is 7

$$y = mx + b$$
$$y = \frac{2}{3}x + 7$$
$$3*y = 3*\frac{2}{3}x + 3*7$$
$$3y = 2x + 21$$
$$-2x + 3y - 21 = 0$$
$$2x - 3y + 21 = 0$$

2. m = -5/3 and b = -2

$$y = mx + b$$
$$y = \frac{-5}{3}x - 2$$
$$3*y = 3*\frac{-5}{3}x - 3*2$$
$$3y = -5x - 6$$
$$5x + 3y = 6 = 0$$

3. slope is 4/7 and contains the point (-1, 4)

$$(y_2 - y_1) = m(x_2 - x_1)$$

$$(y - 4) = \frac{4}{7}(x - (-1))$$

$$7*(y - 4) = 7*\frac{4}{7}(x + 1)$$

$$7y - 28 = 4x + 4$$

$$-4x + 7y - 32 = 0$$

$$4x - 7y + 32 = 0$$

4. m = -7/2 and the point is (-4, -3)

$$(y_2 - y_1) = m(x_2 - x_1)$$

$$(y - (-3)) = \frac{-7}{2}(x - (-4))$$

$$2*(y + 3) = 2*\frac{-7}{2}(x + 4)$$

$$2y + 6 = -7x - 28$$

$$7x + 2y + 34 = 0$$